

## CLAIMS

1. A method of making aircraft flight safe, in particular for a rotary wing aircraft, under instrument flying conditions away from instrument flight infrastructures, the method being characterized by the following steps:
- a) determining a safe route for the aircraft;
  - b) causing said aircraft to follow the safe route as determined in this way; and
  - c) while following the safe route, automatically performing the following operations while making use solely of means not connected to air navigation infrastructures:
    - $\alpha$ ) verifying the safety of the actual trajectory of the aircraft;
    - $\beta$ ) verifying the safety of the aircraft flight relative to any other aircraft; and
    - $\gamma$ ) providing assistance in perceiving the environment outside the aircraft.
2. A method according to claim 1, characterized in that in step a), in order to determine a safe route for the aircraft, the following steps are performed:
- a1) an operator constructs a route for the aircraft using an interactive graphics route-construction tool (7) coupled to an interference calculator (2) and to a memory (4);
  - a2) determining possible interference between said route and a model of the terrain overflowed by the aircraft; and
  - a3) presenting any interference to the operator to enable the operator to modify the construction of said route so as to cause said interference to disappear, the sequence of said steps a1) to a3) being repeated until all said interference, if any, has disappeared.
3. A method according to either preceding claim, characterized in that during step c $\alpha$ ) of verifying the

safety of the actual trajectory of the aircraft, the following steps are performed:

- 5        $\alpha 1$ ) verifying that the deviation between a theoretical route for the aircraft and the actual position of the aircraft remains less than a predetermined value;
- $\alpha 2$ ) verifying that the immediate future trajectory of the aircraft is safe relative to theoretical terrain; and
- 10        $\alpha 3$ ) verifying that the immediate future trajectory of the aircraft is safe relative to real terrain.

4. A method according to any preceding claim, characterized in that in step c $\gamma$ ), at least when the  
15 aircraft is close to the ground, images picked up of the outside environment are superposed on the real outside view.

5. A method according to any preceding claim,  
20 characterized in that in step c $\gamma$ ), at least while the aircraft is at least at a predetermined distance from the ground, a safety line situated above the relief is superposed on the real outside view.

25 6. A method according to any preceding claim, characterized in that in step c $\gamma$ ), at least some of the following information is presented to a pilot of the aircraft;

- the hypsometric environment;
- 30       • the aviation environment; and
- any aircraft situated at a distance from said aircraft that is less than a predetermined distance.

7. Apparatus for making a flight safe under instrument  
35 flying conditions and outside instrument flying infrastructures, the apparatus being on board or being capable of being mounted on board an aircraft, in

particular a rotary wing aircraft, the apparatus being characterized in that it comprises at least:

- means (3) for acquiring parameters relating to the aircraft and to the outside environment;
  - 5       · display means (6);
  - a navigation calculator (8) including an interference calculator (2) associated with a memory (4) for storing a constructed route and with a memory (5) containing a model of the terrain to be overflown;
  - 10       · an interactive graphics route-construction tool (7) coupled to the interference calculator (2) that serves, when actuated by an operator, to display a result on the display means (6) enabling the safe route to be constructed progressively, which route is stored in the
  - 15       memory (4); and
  - a piloting system (9) connected to the calculator (8) via a connection (10) and including a piloting screen.
- 20   8. Apparatus according to claim 7, characterized in that it further includes at least one means (12) for providing assistance in perceiving the environment outside the aircraft.